p-Menthane-3,8-diol

***p*-Menthane-3,8-diol**, also known as ***para*-menthane-3,8-diol**, **PMD**, or **menthoglycol**, is an organic compound classified as a diol and a terpenoid. It is colorless. Its name reflects the hydrocarbon backbone, which is that of *p*-menthane. A total of eight stereoisomers are possible, based on the three stereocenters of the ring. Depending on the source, one or more may predominate.

PMD is the active ingredient in some insect repellents. Its odor and chemical structure are similar to menthol, and it has a cooling feel.[1] It is found in small quantities in the essential oil from the leaves of *Corymbia citriodora*, formerly known as *Eucalyptus citriodora*. This tree is native to Australia, but is now cultivated in many warm places around the world. *C. citriodora* oil, when refined to increase its PMD content for use in insect repellents, is known in the United States as *oil of lemon eucalyptus* (OLE).[2] *C. citriodora* oil contains only 1–2% PMD, while refined OLE contains approximately up to 70% PMD.[3] Some commercial PMD products are not made from *C. citriodora* oil, but rather from synthetic citronellal.

Effectiveness

A 2006 study showed that PMD used as a repellent is as effective as DEET when used in like quantities.[4]

Contraindications

PMD should not be used on children under 3 years of age.[5]

Interactions

Few if any studies have evaluated possible interactions when using PMD with sunscreens.[6]

Chemistry

There are eight possible stereoisomers.[7] The exact composition is rarely specified and is commonly assumed to be a complex mixture. PMD can be synthesized by a Prins reaction of citronellal.[3]

Refined OLE contains approximately up to 70% PMD, a mixture of the *cis* and *trans* isomers of *p*-menthane-3,8-diol.

History

Its repellent effect was discovered in the 1960s by the industry.

OLE has been notified under the European Biocidal Products Directive (BPD) 98/8/EC (now BPR Regulation (EU) No. 528/212) under its generic name "PMD rich botanic oil" and is currently proceeding through the registration process with the Health and Safety Executive in the UK. It is also registered with Canada's Pest Management Regulatory Agency under the generic name "PMD and related oil of lemon eucalyptus compounds".

See also

- DEET
- Ethyl butylacetylaminopropionate (IR3535)
- Icaridin
- Permethrin, a pyrethroid insecticide that can be applied to clothing to help prevent bites

References

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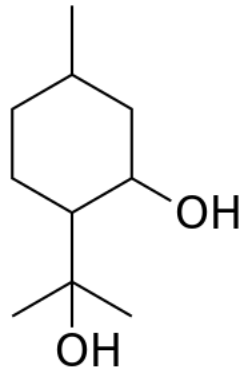

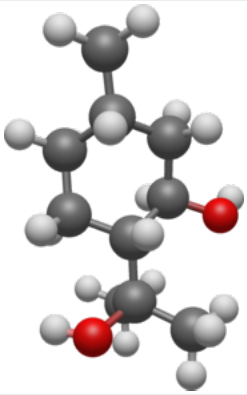

Names

Preferred IUPAC name
2-(2-Hydroxypropan-2-yl)-5-methylcyclohexan-1-ol

Other names
2-(1-Hydroxy-1-methylethyl)-5-methylcyclohexanol
para-Menthane-3,8-diol
2-Hydroxy-α,α,4-trimethylcyclohexanemethanol

Identifiers

CAS Number	42822-86-6 (https://commonchemistry.cas.org/detail?cas_rn=42822-86-6) ✓
3D model (JSmol)	Interactive image (https://chemapp

	s.stolaf.edu/jmol/jmol.php?model=OC%28C1CCC%28CC1O%29C%29%28C%29C)
Beilstein Reference	2552262
ChEBI	CHEBI:48250 (https://www.ebi.ac.uk/chebi/searchId.do?chebiId=48250) ✓
ChEMBL	ChEMBL3120644 (https://www.ebi.ac.uk/chembldb/index.php/compound/inspect/ChEMBL3120644)
ChemSpider	484204 (https://www.chemspider.com/Chemical-Structure.484204.html) ✓
ECHA InfoCard	100.050.849 (https://echa.europa.eu/substance-information/-/substanceinfo/100.050.849)
EC Number	255–9537
KEGG	C02904 (https://www.kegg.jp/entry/C02904)
PubChem CID	556998 (https://pubchem.ncbi.nlm.nih.gov/compound/556998)
UNII	6T6Z1Z1NC4 (https://precision.fda.go

	v/uniisearch/srs/unii/6T6Z1Z1NC4)
CompTox Dashboard (EPA)	DTXSID0035744 (https://comptox.epa.gov/dashboard/chemical/details/DTXSID0035744)
InChI	[show]
SMILES	[show]
Properties	
Chemical formula	$C_{10}H_{20}O_2$
Molar mass	172.268 g·mol^{-1}
Density	1.009 g/cm^3

Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F], 100 kPa).

✓ verify (https://en.wikipedia.org/w/index.php?title=Special:ComparePages&rev1=444039089&page2=P-Menthane-3%2C8-diol)

(what is ✓✗ ?)

Infobox references

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